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METHOD OF RECORDING AND REPRODUCING PHONOFILMS

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Fig. 1

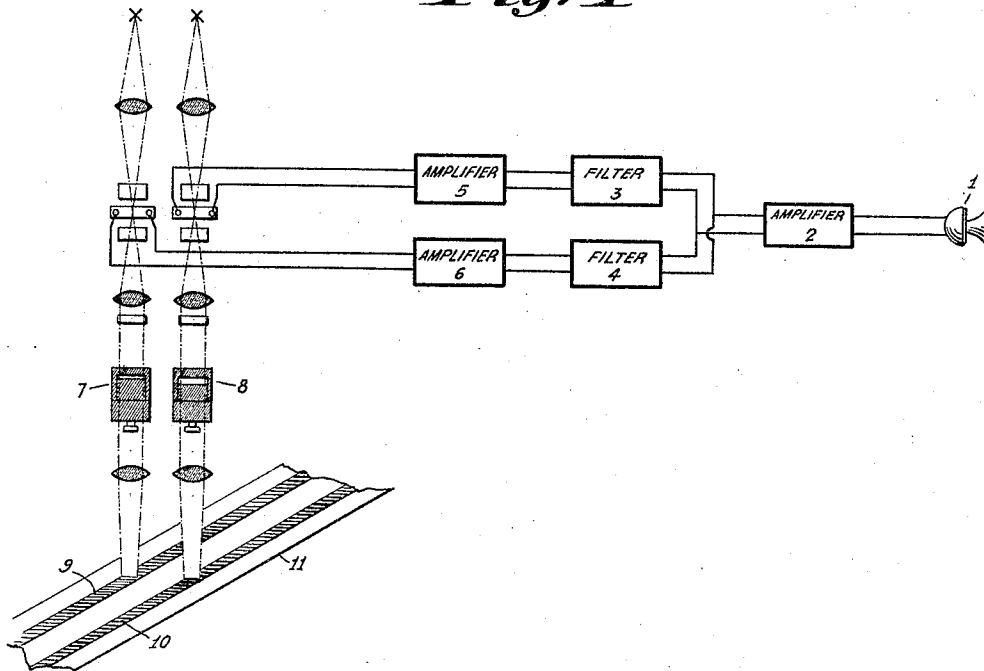
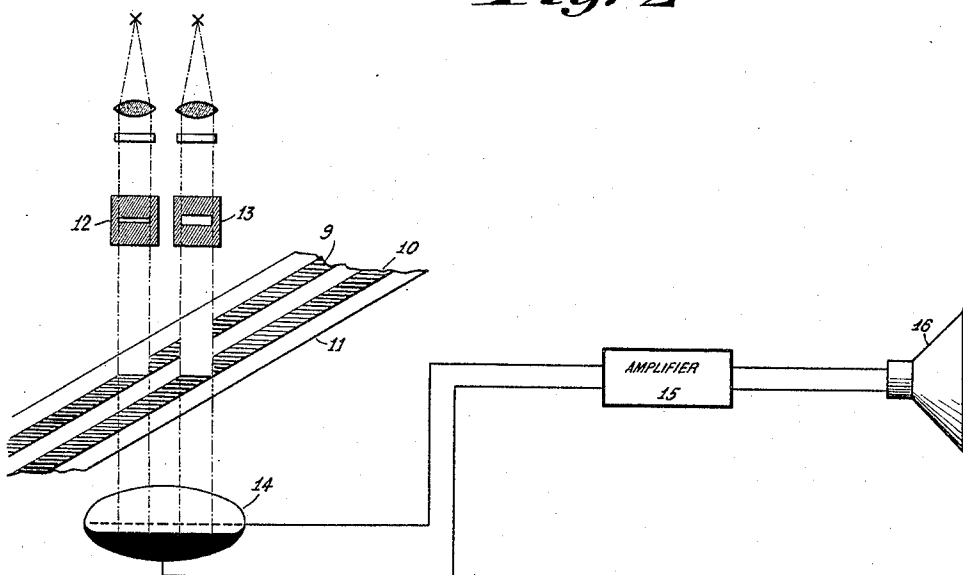


Fig. 2



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METHOD OF RECORDING AND REPRODUCING PHONOFILMS

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In the recording and reproduction of sound upon and from moving films in accordance with the prior art, a single slit has been usually employed. This slit had to be made very narrow in the direction of the movement of the film in order that the photographic impression and photoelectric reproduction of the high frequencies required would be clear and the quality of the voice or music would be good while keeping the speed of film travel inside of moderate limits. The result of this is that the lower frequencies fail to receive proper treatment.

It is an object of this invention to overcome this difficulty.

It is another object of this invention to produce a method of and means for recording and reproducing of phono-films in which the reproduction will be more faithful.

Another object of my invention is to record and reproduce sound upon and from moving films in such a manner that in reproduction the energy derived from low frequency sounds will be in proper proportion to that derived from high frequency sounds, as will be more clearly set forth hereinafter.

The present invention comprises the separation of the vocal and instrumental frequencies in two frequency bands. Such separation is accomplished, for instance, by electrical means by the use of two band pass filters. The low frequencies are brought to act upon a light valve with a comparatively wide slit or gap, and this results in a corresponding acoustic record upon the film. Another light relay is similarly controlled by the high frequencies and provided with a narrow slit producing an adjacent acoustic record upon the same film. Thus the former band will contain the lower frequencies with greater volume, and the second band will contain the higher frequencies.

For the reproduction with photoelectric cells, it is only necessary to throw the light through the film upon a single cell, though with the use of two convenient slits, one thereof being of greater width for the lower ranges of frequencies, and the other of less width for the high frequencies. The light passed through both photoelectric bands on

the film becomes superimposed in the cell and regulate the low and high frequencies under amplitude relations which will be equally favorable to both frequency ranges.

Having thus briefly described my invention, attention is now called to the drawing in which:

Fig. 1 is a diagram showing the method of recording in accordance with my invention;

And Fig. 2 is a schematic view and diagram show the method of reproducing in accordance with my invention.

Referring now more particularly to Fig. 1, 1 denotes the microphone and 2 an amplifier for the microphone currents. Filters 3 and 4 serve for the separation of the high and low frequency band. Amplifiers 5 and 6 amplify the currents passing through the filters 3 and 4 respectively, and supply currents to the light control arrangements in this instance represented as Kerr cells 7 and 8. The former is arranged with a narrow slit and the latter with a wide slit. The resulting bands upon the film are indicated by the bands 9 and 10 upon the photographic film 11.

Referring now more particularly to Fig. 2, 12 and 13 are the two slits corresponding to the slits in the recording apparatus being preferably of regulable width. 14 represents a photoelectric cell which may be of the selenium type upon which the light passing through both of the bands or film through the respective slits is permitted to fall. The current controlled by the photoelectric cell 14 is amplified by the amplifier 15 and reproduced in the loud speaker 16.

I will now briefly describe the operation of my invention. The microphonic currents are divided by the filters 3 and 4 into high and low frequency bands and after amplification serve to control the amount of light reaching the moving film 11. The light controlled by the low frequency band passes to the film through a wide slot, whereas the light controlled by the high frequency band reaches the film through a narrow slot. In reproduction this process is reversed except that the energy generated by light falling through both bands is combined by permit-

ting this light to fall upon the same photoelectric cell, the resistance of which is thus varied in accordance with the total light.

Having thus described my invention, it is to be understood that I do not desire to be limited by the specific embodiment shown and described herein for the purpose of illustration, but rather by the scope of my invention as set forth in the appended claims.

I claim:

1. The method of photographic recording and reproduction which comprises, producing a sound to be recorded, modulating an electric current in accordance with said sound, separating the high and low frequency components of said modulated current, controlling the intensity of a light beam in accordance with each of said frequency components, independently recording the intensity of the light beams on a moving film record, restricting the light permitted to fall upon the moving film record from the light beam controlled by the high frequency to a small area with respect to the line of motion of said film, restricting the light permitted to fall upon the moving film record from the light beam controlled by the low frequency to a relatively large area with respect to the line of motion of said film, thus producing two records upon said film, passing light through the two records, restricting the light passing through each record in the same manner as in the recording, and photoelectrically controlling a single electric current in accordance with the total amount of light passing through the film record, and reproducing the originally recorded sound thereby.

2. The method of photographic recording and reproduction of sound which comprises separating the high and low frequency components of the electric impulses representing said sound, controlling the intensity of a light beam in accordance with each of said frequency components, independently recording the intensity of the said light beams upon a moving film record, restricting the light permitted to fall upon the moving record from the light beams controlled by the high and low frequencies to a small and relatively large area, respectively, with respect to the line of motion of said film, thus producing two records upon said film, passing light through the two records restricting the light passing through each record in the same manner as in the recording, and photoelectrically controlling an electric current in accordance with the total amount of light passing through the two records.

3. Means for the photographic recording and reproduction of sound including recording apparatus comprising means for separating the sound to be recorded into high and low frequency components, means for independently recording the high and low frequency components photoelectrically, includ-

ing means for restricting the light used to record the high and low frequency components falling upon the film to relatively narrow and wide slots with respect to the direction of travel of the film and reproducing apparatus including means for similarly restricting the light passing through the two records, a common photoelectric element adapted to be actuated by the amount of light passing through the film, and reproducing apparatus controlled by said photoelectric cell.

4. A photographic sound reproducing method including producing relatively large and relatively small light beams, modulating said relatively large light beam in accordance with the low frequency component of the sound to be reproduced, modulating said relatively small light beam in accordance with the high frequency component of said sound, and utilizing the total illumination of said modulated beams to produce an electric current dependent on said components.

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